What Is Claimed Is:

1. A sensor element for a sensor for determining the oxygen concentration in the exhaust gas of internal combustion engines, in particular for a broadband lambda sensor, having an ion-conducting solid electrolyte (11) which, together with an inner electrode (14) located in a cavity (19) inside the solid electrolyte (11), and an outer electrode (13), located on the outside of the solid electrolyte (11) and exposed to the exhaust gas, forms a pump cell (12); having a prechamber (20) formed inside the solid electrolyte (11), which has an access opening (24) for the exhaust gas; and having a diffusion channel (21) formed inside the solid electrolyte (11), the diffusion channel (21) having an intake opening (22) toward the prechamber (20) and an exit opening (23) toward the cavity (19), and being filled with a diffusion barrier (25),
wherein a catalytic converter for the oxidation of hydrocarbons is situated in the prechamber (20).

2. The sensor element as recited in Claim 1,
wherein the catalytic converter is a chemical catalytic converter.

3. The sensor element as recited in Claim 2,
wherein the prechamber (20) is filled with a packing of an oxidation-promoting catalyst material such as zirconium oxide, platinum, rhodium or palladium.

4. The sensor element as recited in Claim 1,
wherein the catalytic converter is operated as an electrochemical catalytic converter.

5. The sensor element as recited in Claim 4, wherein the catalytic converter has - installed on two opposing chamber walls of the prechamber (20) - two electrodes (26, 27), connected to one another in an electrically conductive manner, the electrodes being made of an electrically conductive material, essentially containing a precious metal, preferably platinum, rhodium, palladium, and/or an alloy thereof.

6. The sensor element as recited in Claim 5, wherein an oxidation-promoting oxide such as zirconium oxide, zeolite, aluminum oxide, or cerium oxide is added to the electrode material.

7. The sensor element as recited in Claim 5 or 6, wherein the chamber walls of the prechamber (20) supporting the electrodes (26, 27) are aligned parallel to the center axes of the access opening (24) of the prechamber (20) and the intake opening (22) of the diffusion channel (21), and the center axes are preferably aligned with each other.

8. The sensor element as recited in one of Claims 1 through 7, wherein the access cross section of the prechamber (20) for the exhaust gas is much larger than the access cross section at the diffusion barrier (25) in the diffusion channel.

9. The sensor element as recited in one of Claims 5 through 8, wherein, during the operation of the sensor, the electrodes (26, 27) of the prechamber (20) are permanently or intermittently connected to a DC potential which is higher than that of the outer

electrode (13) of the pump cell (12).

10. The sensor element as recited in one of Claims 5 through 7,
wherein the surfaces of the electrodes (26, 27) in the prechamber (20) are coated with a cermet formed via an electrochemical forming process from the electrode material and the material of the solid electrolyte (11).

11. A method for forming the electrodes (26, 27) in the prechamber (20) in the sensor element as recited in Claim 7,
wherein a DC voltage having a higher potential at the outer electrode (13) is applied to the electrodes (26, 27) in the prechamber (20) and to the outer electrode (13) of the pump cell (12) for a limited time.

12. The method as recited in Claim 11,
wherein the DC voltage is higher than the decomposition voltage of the material of the solid electrolyte (11).

13. The method as recited in Claim 10 or 11,
wherein the solid electrolyte (11) is heated to a temperature of between 800°C and 1200°C while being connected to the DC voltage.

14. The method as recited in one of Claims 11 through 13,
wherein the duration of the exposure to DC voltage of the electrodes (26, 27) is several minutes.

15. The method as recited in one of Claims 11 through 14,
wherein the limited-duration connection to DC voltage can be used repeatedly while the sensor is in use.